

submission requesting OMB clearance of this collection for no longer than three years.

Comments are invited on (a) whether the proposed collection of information is necessary for the proper performance of the functions of the Agency, including whether the information shall have practical utility; (b) the accuracy of the Agency's estimate of the burden of the proposed collection of information; (c) ways to enhance the quality, utility, and clarity of the information on respondents, including through the use of automated collection techniques or other forms of information technology; and (d) ways to minimize the burden of the collection of information on respondents, including through the use of automated collection techniques or other forms of information technology.

DATES: Written comments should be received by September 7, 2021, to be assured of consideration. Comments received after that date will be considered to the extent practicable.

ADDRESSES: Written comments regarding the information collection and requests for copies of the proposed information collection request should be addressed to Suzanne Plimpton, Reports Clearance Officer, National Science Foundation, 2415 Eisenhower Avenue, Room W18253, Alexandria, VA 22314, or by email to splimpto@nsf.gov.

FOR FURTHER INFORMATION CONTACT: Suzanne Plimpton on (703) 292-7556 or send email to splimpto@nsf.gov. Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1-800-877-8339, which is accessible 24 hours a day, 7 days a week, 365 days a year (including federal holidays).

SUPPLEMENTARY INFORMATION:

Title of Collection: DUE Project Data Form.

OMB Control No.: 3145-0201.

Expiration Date of Approval: December 31, 2021.

Abstract: The Division of Undergraduate Education (DUE) Project Data Form is a component of all grant proposals submitted to NSF's Division of Undergraduate Education. This form collects information needed to direct proposals to appropriate reviewers and to report the estimated collective impact of proposed projects on institutions, students, and faculty members. Requested information includes the discipline of the proposed project, collaborating organizations involved in the project, the academic level on which the project focuses (e.g., lower-level undergraduate courses, upper-level undergraduate courses), characteristics

of the organization submitting the proposal, special audiences (if any) that the project would target (e.g., women, underrepresented minorities, persons with disabilities), strategic foci (if any) of the project (e.g., research on teaching and learning, international activities, integration of research and education), and the number of students and faculty at different educational levels who would benefit from the project.

Respondents: Investigators who submit proposals to NSF's Division of Undergraduate Education.

Estimated Number of Annual

Respondents: 2,550.

Burden on the Public: 20 minutes (per response) for an annual total of 850 hours.

Dated: June 30, 2021.

Suzanne H. Plimpton,

Reports Clearance Officer, National Science Foundation.

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NUCLEAR REGULATORY COMMISSION

[Docket Nos. 50-456 and 50-457; NRC-2021-0128]

Exelon Generation Company, LLC; Braidwood Station, Units 1 and 2

AGENCY: Nuclear Regulatory Commission.

ACTION: Environmental assessment and finding of no significant impact; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of amendments to Renewed Facility Operating License Nos. NPF-72 and NPF-77, that were issued to Exelon Generation Company, LLC, (licensee) for operation of the Braidwood Station, Units 1 and 2. The proposed amendments are contained in the licensee's letter dated May 27, 2021, and would change technical specifications (TSs) surveillance requirement (SR) 3.7.9.2 to allow an ultimate heat sink (UHS) temperature of less than or equal to 102.8 degrees Fahrenheit (°F) until September 30, 2021.

DATES: The environmental assessment and finding of no significant impact referenced in this document are available on July 7, 2021.

ADDRESSES: Please refer to Docket ID NRC-2021-0128 when contacting the NRC about the availability of information regarding this document. You may obtain publicly available information related to this document using any of the following methods:

- **Federal Rulemaking website:** Go to <https://www.regulations.gov> and search for Docket ID NRC-2021-0128. Address questions about Docket IDs in *Regulations.gov* to Stacy Schumann; telephone: 301-415-0624; email: Stacy.Schumann@nrc.gov. For technical questions, contact the individuals listed in the **FOR FURTHER INFORMATION**

CONTACT section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at <https://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to pdr.resource@nrc.gov. For the convenience of the reader, the ADAMS accession numbers are provided in a table in the "Availability of Documents" section of this document.

- **Attention:** The PDR, where you may examine and order copies of public documents, is currently closed. You may submit your request to the PDR via email at pdr.resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8:00 a.m. and 4:00 p.m. (ET), Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT:

Briana Arlene, Office of Nuclear Material Safety and Safeguards, telephone: 301-415-1042; email: Briana.Arlene@nrc.gov; and Joel Wiebe, Office of Nuclear Reactor Regulation, telephone: 301-415-6606, email: Joel.Wiebe@nrc.gov. Both are staff of the U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

SUPPLEMENTARY INFORMATION:

I. Introduction

The NRC is considering issuance of amendments to Renewed Facility Operating License Nos. NPF-72 and NPF-77, that were issued to Exelon Generation Company, LLC, (Exelon) for operation of the Braidwood Station, Units 1 and 2, located in Will County, Illinois. Exelon submitted its license amendment request in accordance with Section 50.90 of title 10 of the *Code of Federal Regulation* (10 CFR), by letter dated May 27, 2021. If approved, the license amendments would revise technical specification SR in TS 3.7.9.2 to allow a temporary increase in the allowable UHS average temperature of less than or equal to (\leq) 102.8 °F (39.3 degrees Celsius (°C)) through September 30, 2021. Therefore, as required by 10

CFR 50.21, the NRC performed an environmental assessment (EA). Based on the results of the EA that follows, the NRC has determined not to prepare an environmental impact statement for the proposed amendments and is issuing a finding of no significant impact (FONSI).

II. Environmental Assessment

Plant Site and Environs

Braidwood is in Will County, Illinois approximately 50 miles (mi); 80 kilometers (km) southwest of the Chicago Metropolitan Area and 20 mi (32 km) south-southwest of Joliet. The Kankakee River is approximately 5 mi (8 km) east of the eastern site boundary. An onsite 2,540-acre (ac); 1,030-hectare (ha) cooling pond provides condenser cooling. Cooling water is withdrawn from the pond through the lake screen house, which is located at the north end of the pond. Heated water returns to the cooling pond through a discharge canal west of the lake screen house intake that is separated from the intake by a dike. The pond typically holds 22,300 acre-feet (27.5 million cubic meters) of water at any given time. The cooling pond includes both “essential” and “non-essential” areas. The essential cooling pond is the portion of the cooling pond that serves as the UHS for emergency core cooling, and it consists of a 99-ac (40-ha) excavated area of the pond directly in front of the lake screen house. The essential cooling pond’s principal functions are to dissipate residual heat after reactor shutdown and to dissipate heat after an accident. It is capable of supplying Braidwood’s cooling system with water for 30 days of station operation without additional makeup water. For clarity, use of the term “UHS” in this EA refers to the 99-ac (40-ha) essential cooling pond, and use of the term “cooling pond” or “pond” describes the entire 2,540-ac (1,030-ha) area, which includes both the essential and non-essential areas.

The cooling pond is part of the Mazonia-Braidwood State Fish and Wildlife Area, which encompasses the majority of the non-UHS area of the cooling pond as well as Illinois Department of Natural Resources (IDNR) owned lands adjacent to the Braidwood site to the south and southwest of the cooling pond. Exelon and the IDNR have jointly managed the cooling pond as part of the Mazonia-Braidwood State Fish and Wildlife Area since 1991 pursuant to a long-term lease agreement. Under the terms of the agreement, the public has access to the pond for fishing, waterfowl hunting, fossil

collecting, and other recreational activities.

The cooling pond is a wastewater treatment works as defined by Section 301.415 of Title 35 of the *Illinois Administrative Code* (35 IAC 301.415). Under this definition, the cooling pond is not considered waters of the State under Illinois Administrative Code (35 IAC 301.440) or waters of the United States under the Federal Clean Water Act (40 CFR 230.3(s)), and so the cooling pond is not subject to State water quality standards. The cooling pond can be characterized as a managed ecosystem where IDNR fish stocking and other human activities primarily influence the species composition and population dynamics.

Since the beginning of the lease agreement between Exelon and IDNR, the IDNR has stocked the cooling pond with a variety of game fish, including largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), blue catfish (*Ictalurus furcatus*), striped bass (*Morone saxatilis*), crappie (*Pomoxis* spp.), walleye (*Sander vitreum*), and tiger muskellunge (*Esox masquinongy x lucius*). IDNR performs annual surveys to determine which fish to stock based on fishermen preferences, fish abundance, different species’ tolerance to warm waters, predator and prey dynamics, and other factors. Because of the warm water temperatures experienced in the summer months, introductions of warm-water species, such as largemouth bass and blue catfish, have been more successful than introductions of cool-water species, such as walleye and tiger muskellunge. Since annual surveys began in 1980, IDNR has collected 47 species in the cooling pond. In recent years, bluegill (*Lepomis macrochirus*), channel catfish (*Ictalurus punctatus*), threadfin shad (*Dorosoma petenense*), and common carp (*Cyprinus carpio*) have been among the most abundant species in the cooling pond. Gizzard shad (*Dorosoma cepedianum*), one of the most frequently affected species during periods of elevated pond temperatures, have decreased in abundance dramatically in recent years, while bluegills, which can tolerate high temperatures with relatively high survival rates, have noticeably increased in relative abundance. IDNR-stocked warm water game species, such as largemouth bass and blue catfish, continue to persist in small numbers, while cooler water stocked species, such as walleye and tiger muskellunge, no longer appear in IDNR survey collections. No federally listed species or designated critical habitats protected under the Endangered

Species Act (ESA) occur within or near the cooling pond.

The Kankakee River serves as the source of makeup water for the cooling pond. The river also receives continuous blowdown from the cooling pond. Water is withdrawn from a small river screen house located on the Kankakee River, and liquid effluents from Braidwood are discharged into the cooling pond blowdown line, which subsequently discharges into the Kankakee River.

The plant site and environs are described in greater detail in Chapter 3 of the NRC’s November 2015, Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Braidwood Station, Units 1 and 2, Final Report (NUREG-1437, Supplement 55) (herein referred to as the “Braidwood FSEIS” (Final Supplemental Environment Impact Statement)). Figure 3–5 on page 3–7 of the Braidwood FSEIS depicts the Braidwood plant layout, and Figure 3–4 on page 3–6 depicts the cooling pond, including the portion of the pond that constitutes the essential cooling pond (or UHS) and the blowdown line to the Kankakee River.

Description of the Proposed Action

The proposed action would revise the Braidwood TS to allow a temporary increase in the allowable average temperature of water withdrawn from the UHS and supplied to the plant for cooling from $\leq 102^{\circ}\text{F}$ (38.9°C) to $\leq 102.8^{\circ}\text{F}$ (39.3°C) until September 30, 2021. Specifically, the proposed action would revise TS SR 3.7.9.2, which currently states, “Verify average water temperature of UHS is $\leq 102.8^{\circ}\text{F}$ until September 30, 2020. After September 30, 2020, verify average water temperature of UHS is $\leq 102^{\circ}\text{F}$ ” to state “Verify average water temperature of UHS is $\leq 102.8^{\circ}\text{F}$ until September 30, 2021. After September 30, 2021, verify average water temperature of UHS is $\leq 102^{\circ}\text{F}$.”

Under the current TS, if the average UHS temperature as measured at the discharge of the operating essential service water system pumps is greater than 102°F (38.9°C), TS 3.7.9 Required Actions A.1 and A.2 would be entered concurrently and would require the licensee to place Braidwood in hot standby (Mode 3) within 12 hours and cold shutdown (Mode 5) within 36 hours. The proposed action would allow Braidwood to continue to operate during times when the UHS indicated average water temperature exceeds 102°F (38.9°C) but is less than or equal to 102.8°F (39.3°C) until September 30, 2021. The current TS’s UHS average

water temperature limit of 102 °F (38.9 °C) would remain applicable to all other time periods beyond September 30, 2021.

The proposed action is nearly identical to previously approved license amendments that allowed for the average water temperature of the UHS to be ≤102.8 °F until September 30, 2020. The NRC issued an EA for the 2020 UHS amendments in the **Federal Register** on September 10, 2020, (85 FR 55863) and the NRC issued the amendments on September 24, 2020. The only difference between the previously approved amendments to SR 3.7.9.2 and the proposed action is that the proposed action would replace “2020” with “2021.” The proposed action is in accordance with the licensee’s application dated May 27, 2021.

Need for the Proposed Action

The licensee has requested the proposed amendments in connection with historical meteorological and atmospheric conditions that have resulted in the TS UHS temperature being challenged. These conditions included elevated air temperatures, high humidity, and low wind speed. Specifically, from July 4, 2020, through July 9, 2020, northern Illinois experienced high air temperatures and drought conditions, which caused sustained elevated UHS temperatures. In response to these conditions in 2020, the licensee submitted license amendment requests contained in the licensee’s letter dated July 15, 2020, as supplemented by letter dated August 14, 2020. The NRC subsequently granted Exelon’s request in September 2020. The licensee projects that similar conditions are likely this year.

The proposed action would provide the licensee with operational flexibility until September 30, 2021, during which continued high UHS temperatures are likely so that the plant shutdown criteria specified in the TS are not triggered.

Environmental Impacts of the Proposed Action

Regarding radiological impacts, the proposed action would not result in any changes in the types of radioactive effluents that may be released from the plant offsite. No significant increase in the amount of any radioactive effluent released offsite or significant increase in occupational or public radiation exposure is expected from the proposed action. Separate from this EA, the NRC staff is evaluating the licensee’s safety analyses of the potential radiological consequences of an accident that may result from the proposed action. The

results of the NRC staff’s safety analysis will be documented in a safety evaluation (SE). If the NRC staff concludes in the SE that all pertinent regulatory requirements related to radiological effluents are met by the proposed UHS temperature limit increase, then the proposed action would result in no significant radiological impact to the environment. The NRC staff’s SE will be issued with the license amendments, if approved by the NRC. If the NRC staff concludes that all pertinent regulatory requirements are not met by the proposed UHS temperature limit increase, the requested amendment would not be issued.

Regarding potential non-radiological impacts, temporarily raising the maximum allowable UHS temperature from ≤102 °F (38.9 °C) to ≤102.8 °F (39.3 °C) could cause increased cooling pond water temperatures until September 30, 2021. Because the proposed action would not affect Braidwood’s licensed thermal power level, the temperature rise across the condensers as cooling water travels through the cooling system would remain constant. Thus, if water in the UHS were to rise to 102.8 °F (39.3 °C), heated water returning to the cooling pond through the discharge canal, which lies west of the river screen house, would also experience a corresponding 0.8 °F (0.4 °C) increase. That additional heat load would dissipate across some thermal gradient as discharged water travels down the discharge canal and through the 99-ac (40-ha) UHS.

Fish kills are likely to occur when cooling pond temperatures rise above 95 °F (35 °C), the temperature at which most fish in the cooling pond are thermally stressed. For example, Section 3.7.4 of the Braidwood FSEIS describes six fish kill events for the period of 2001 through 2015. The fish kill events, which occurred in July 2001, August 2001, June 2005, August 2007, June 2009, and July 2012, primarily affected threadfin shad and gizzard shad, although bass, catfish, carp, and other game fish were also affected. Reported peak temperatures in the cooling pond during these events ranged from 98.4 °F (36.9 °C) to over 100 °F (37.8 °C), and each event resulted in the death of between 700 to as many as 10,000 fish. During the July 2012 event, cooling pond temperatures exceeded 100 °F (37.8 °C), which resulted in the death of approximately 3,000 gizzard shad and 100 bass, catfish, and carp. This event coincided with the NRC’s granting of Enforcement Discretion to allow Braidwood to continue to operate above the TS limit of ≤100 °F (37.8 °C). The

IDNR attributed this event, as well as four of the other fish kill events, to high cooling pond temperatures resulting from Braidwood operation. Appendix B, Section 4.1 of the Braidwood renewed facility operating licenses, requires Exelon to report to the NRC the occurrence of unusual or important environmental events, including fish kills, causally related to plant operation. Since the issuance of the Braidwood FSEIS in November 2015, Exelon has not reported any additional fish kill events to the NRC. Although not causally related to plant operation, fish kills have occurred since this time, the most recent of which occurred in August 2018 and July 2020.

In Section 4.7.1.3 of the Braidwood FSEIS, the NRC staff concluded that thermal impacts associated with continued operation of Braidwood during the license renewal term would result in SMALL to MODERATE impacts to aquatic resources in the cooling pond. MODERATE impacts would primarily be experienced by gizzard shad and other non-stocked and low-heat tolerant species. As part of its conclusion, the NRC staff also noted that because the cooling pond is a highly managed system, any cascading effects that result from the loss of gizzard shad (such as reduction in prey for stocked species, which in turn could affect those stocked species’ populations) could be mitigated through IDNR’s annual stocking and continual management of the pond. At that time, the UHS TS limit was ≤100 °F (37.8 °C).

In 2016, the NRC granted license amendments that increased the allowable UHS average water temperature TS limit from ≤100 °F (37.8 °C) to ≤102.0 °F (38.9 °C). In the EA associated with these amendments, the NRC staff concluded that increasing the TS limit to ≤102.0 °F (38.9 °C) would have no significant environmental impacts, and the NRC issued a FONSI with the EA.

In 2020, the NRC granted license amendments that temporarily increased the allowable UHS average water temperature TS limit from ≤102.0 °F (38.9 °C) to ≤102.8 °F (39.3 °C) until September 30, 2020. In the EA associated with these amendments, the NRC staff concluded that temporarily increasing the TS limit to ≤102.8 °F (39.3 °C) would have no significant environmental impacts, and the NRC issued a FONSI with the EA.

The NRC staff finds that the proposed action would not result in significant impacts to aquatic resources in the cooling pond for the same reasons that the NRC staff made this conclusion regarding the 2020 amendments. The

staff's justification for this conclusion follows.

The proposed increase in the allowable UHS average water temperature limit by 0.8 °F (0.4 °C) would not increase the likelihood of a fish kill event attributable to high cooling pond temperatures because the current TS limit for the UHS of 102.0 °F (38.9 °C) already allows cooling pond temperatures above those at which most fish species are thermally stressed (95 °F (35 °C)). In effect, if the UHS temperature rises to the current TS limit, fish within or near the discharge canal, within the flow path between the discharge canal and UHS, or within the UHS itself would have already experienced thermal stress and possibly died. Thus, an incremental increase in the allowable UHS water temperature by 0.8 °F (0.4 °C) and the corresponding temperature increases within and near the discharge canal and within the flow path between the discharge canal and UHS would not significantly affect the number of fish kill events experienced in the cooling pond. Additionally, the proposed action would only increase the allowable UHS average water temperature until September 30, 2021. Thus, any impacts to the aquatic community of the cooling pond, if experienced, would be temporary in nature, and fish populations would likely recover relatively quickly.

While the proposed action would not affect the likelihood of a fish kill event occurring during periods when the average UHS water temperature approaches the TS limit, the proposed action could increase the number of fish killed per high temperature event. For fish with thermal tolerances at or near 95 °F (35 °C), there would likely be no significant difference in the number of affected fish per high temperature event because, as already stated, these fish would have already experienced thermal stress and possibly died and the additional temperature increase would not measurably affect the mortality rate of these individuals. For fish with thermal tolerances above 95 °F (35 °C), such as bluegill, increased mortality is possible, as described in this notice.

The available scientific literature provides conflicting information as to whether incremental temperature increases would cause a subsequent increase in mortality rates of bluegill or other high-temperature-tolerant fish when temperatures exceed 100 °F (37.8 °C). For instance, in laboratory studies, Banner and Van Arman (1973) demonstrated 85 percent survival of juvenile bluegill after 24 hours of exposure to 98.6 °F (37.0 °C) water for stock acclimated to 91.2 °F (32.9 °C). At

100.0 °F (37.8 °C), survival decreased to 25 percent, and at 100.4 °F (38.0 °C) and 102.0 °F (38.9 °C), no individuals survived. Even at one hour of exposure to 102.0 °F (38.9 °C) water, average survival was relatively low at between 40 to 67.5 percent per replicate. However, in another laboratory study, Cairns (1956 in Banner and Van Arman 1973) demonstrated that if juvenile bluegill were acclimated to higher temperatures at a 3.6 °F (2.0 °C) increase per day, individuals could tolerate water temperatures up to 102.6 °F (39.2 °C) with 80 percent survival after 24 hours of exposure.

Although these studies provide inconsistent thermal tolerance limits, information from past fish kill events indicates that Cairns' results better describe the cooling pond's bluegill population because Exelon has not reported bluegill as one of the species that has been affected by past high temperature events. Thus, bluegills are likely acclimating to temperature rises at a rate that allows those individuals to remain in high temperature areas until temperatures decrease or that allows individuals time to seek refuge in cooler areas of the pond. Alternately, if Banner and Van Arman's results were more predictive, 75 percent or more of bluegill individuals in high temperature areas of the cooling pond could be expected to die at temperatures approaching or exceeding 100 °F (37.8 °C) for 24 hours, and shorter exposure time would likely result in the death of some reduced percentage of bluegill individuals.

Under the proposed action, fish exposure to temperatures approaching the proposed UHS TS average water temperature limit of 102.8 °F (39.3 °C) and those exposed to the associated discharge, which would be 0.8 °F (0.4 °C) higher than under the current TS limit, for at least one hour would result in observable deaths. However, as stated previously, Exelon has not reported bluegill as one of the species that has been affected during past fish kills. Consequently, the NRC staff assumes that bluegill and other high-temperature-tolerant species in the cooling pond would experience effects similar to those observed in Cairn's study. Based on Cairn's results, the proposed action's incremental and short-term increase of 0.8 °F (0.4 °C) could result in the death of some additional high-temperature-tolerant individuals, especially in cases where cooling pond temperatures rise dramatically over a short period of time (more than 3.6 °F (2.0 °C) in a 24-hour period).

Nonetheless, the discharge canal, flow path between the discharge canal and the UHS, and the UHS itself is a small portion of the cooling pond. Thus, while the incremental increase would likely increase the area over which cooling pond temperatures would rise, most of the cooling pond would remain at tolerable temperatures, and fish would be able to seek refuge in those cooler areas. Therefore, only fish within or near the discharge canal, within the flow path between the discharge canal and UHS, or within the UHS itself at the time of elevated temperatures would likely be affected, and fish would experience such effects to lessening degrees over the thermal gradient that extends from the discharge canal. This would not result in a significant difference in the number of fish killed per high temperature event resulting from the proposed action when compared to current operations for those species with thermal tolerances at or near 95 °F (35 °C) and an insignificant increase in the number of individuals affected for species with thermal tolerances above 95 °F (35 °C), such as bluegill. Additionally, the cooling pond is a managed ecosystem in which fish stocking, fishing pressure, and predator-prey relationships constitute the primary population pressures.

Fish populations affected by fish kills generally recover quickly, and thus, fish kills do not appear to significantly influence the fish community structure. This is demonstrated by the fact that the species that are most often affected by high temperature events (threadfin shad and gizzard shad) are also among the most abundant species in the cooling pond. Managed species would continue to be assessed and stocked by the IDNR on an annual basis in accordance with the lease agreement between Exelon and IDNR. Continued stocking would mitigate any minor effects resulting from the proposed action.

Based on the foregoing analysis, the NRC staff concludes that the proposed action would not result in significant impacts to aquatic resources in the cooling pond.

Some terrestrial species, such as birds or other wildlife, rely on fish or other aquatic resources from the cooling pond as a source of food. The NRC staff does not expect any significant impacts to birds or other wildlife because, if a fish kill occurs, the number of dead fish would be a small proportion of the total population of fish in the cooling pond. Furthermore, during fish kills, birds and other wildlife could consume many of the floating, dead fish. Additionally, and as described previously, the NRC staff does not expect that the proposed

action would result in a significant difference in the number or intensity of fish kill events or otherwise result in significant impacts on aquatic resources in the cooling pond.

With respect to water resources and ecological resources along and within the Kankakee River, the Illinois Environmental Protection Agency imposes regulatory controls on Braidwood's thermal effluent through Title 35, Environmental Protection, Section 302, "Water Quality Standards," of the Illinois Administrative Code (35 IAC 302) and through the National Pollutant Discharge Elimination System (NPDES) permitting process pursuant to the Clean Water Act. Section 302 of the Illinois Administrative Code stipulates that "[t]he maximum temperature rise shall not exceed 2.8 °C (5 °F) above natural receiving water body temperatures," (35 IAC 302.211(d)) and that "[w]ater temperature at representative locations in the main river shall at no time exceed 33.7 °C (93 °F) from April through November and 17.7 °C (63 °F) in other months" (35 IAC 302.211(e)). Additional stipulations pertaining to the mixing zone further protect water resources and biota from thermal effluents. The Braidwood NPDES permit contains special conditions that mirror these temperature requirements and that stipulate more detailed temperature requirements at the edge of the mixing zone. Under the proposed action, Braidwood thermal effluent would continue to be limited by the Illinois Administrative Code and the Braidwood NPDES permit to ensure that Braidwood operations do not create adverse effects on water resources or ecological resources along or within the Kankakee River. Occasionally, Exelon has applied for a provisional variance to allow higher-than-permitted temperatures at the edge of the discharge mixing zone. For instance, Exelon applied for and the IEPA granted one provisional variance in 2012 during a period of extremely warm weather and little to no precipitation. Exelon reported no fish kills or other events to the IEPA or the NRC that would indicate adverse environmental effects resulting from the provisional variance. The details of this provisional variance are described in Section 4.7.1.3 of the Braidwood FSEIS.

Under the proposed action, Exelon would remain subject to the regulatory controls described in this notice. The NRC staff finds it reasonable to assume that Exelon's continued compliance with, and the State's continued enforcement of, the Illinois Administrative Code and the Braidwood NPDES permit would ensure that

Kankakee River water and ecological resources are protected. Further, the proposed action would not alter the types or amount of effluents being discharged to the river as blowdown. Therefore, the NRC staff does not expect any significant impacts to water resources or ecological resources within and along the Kankakee River from temporarily increasing the allowable UHS average water temperature TS limit.

With respect to federally listed species, the NRC staff consulted with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the ESA during its license renewal environmental review for Braidwood. During that consultation, the NRC staff found that the sheepnose (*Plethobasus cyphus*) and snuffbox (*Epioblasma triquetra*) mussels had the potential to occur in the areas that would be directly or indirectly affected by license renewal (*i.e.*, the action area). In September 2015, Exelon transmitted the results of a mussel survey to the NRC and FWS. The survey documented the absence of federally listed mussels near the Braidwood discharge site in the Kankakee River. Based on this survey and other information described in the Braidwood FSEIS, the NRC concluded that the license renewal may affect, but is not likely to adversely affect the sheepnose mussel, and the NRC determined that license renewal would have no effect on the snuffbox mussel. The FWS concurred with the NRC's "not likely to adversely affect" determination in a letter dated October 20, 2015. The results of the consultation are further summarized in the Record of Decision for Braidwood license renewal.

As previously described, impacts of the proposed action would be confined to the cooling pond and would not affect water resources or ecological resources along and within the Kankakee River. The NRC's previous ESA section 7 consultation confirmed that no federally listed aquatic species occur within or near the cooling pond. The NRC has not identified any information indicating the presence of federally listed species in the area since that consultation concluded, and the FWS has not listed any new aquatic species that may occur in the area since that time. The proposed action would not result in any disturbance or other impacts to terrestrial habitats, and thus, no federally listed terrestrial species would be affected. Accordingly, the NRC staff concludes that the proposed action would have no effect on federally listed species or designated critical habitat. Consultation with the FWS for the proposed action is not necessary

because Federal agencies are not required to consult with the FWS if the agency determines that an action will have no effect on listed species or critical habitat.

The NRC staff has identified no foreseeable land use, visual resource, noise, or waste management impacts given that the proposed action would not result in any physical changes to Braidwood facilities or equipment or changes any land uses on or off site. The NRC staff has identified no air quality impacts given that the proposed action would not result in air emissions beyond what would be experienced during current operations. Additionally, there would be no socioeconomic, environmental justice, or historic and cultural resource impacts associated with the proposed action since no physical changes would occur beyond the site boundaries and any impacts would be limited to the cooling pond.

Based on the foregoing analysis, the NRC staff concludes that the proposed action would have no significant environmental impacts.

Environmental Impacts of the Alternatives to the Proposed Action

As an alternative to the proposed action, the NRC staff considered the denial of the proposed action (*i.e.*, the "no-action" alternative). Denial of the proposed action would result in no changes to the current TS. Thus, under the proposed action, the licensee would continue to be required to place Braidwood in hot standby (Mode 3) if average UHS water temperatures exceed 102 °F (38.9 °C) for the temporary period of July 2021 through September 2021. The no-action alternative would result in no change in current environmental conditions or impacts at Braidwood.

Alternative Use of Resources

There are no unresolved conflicts concerning alternative uses of available resources under the proposed action.

Agencies and Persons Consulted

No additional agencies or persons were consulted regarding the environmental impact of the proposed action.

III. Finding of No Significant Impact

The NRC is considering issuing amendments for Renewed Facility Operating License Nos. NPF-72 and NPF-77, issued to Exelon for operation of Braidwood that would revise the TS for the plant to temporarily increase the allowable average temperature of the UHS.

On the basis of the EA included in Section II and incorporated by reference

in this finding, the NRC concludes that the proposed action would not have significant effects on the quality of the human environment. The NRC's evaluation considered information provided in the licensee's application as well as the NRC's independent review of other relevant environmental documents. Section IV lists the environmental documents related to the proposed action and includes information on the availability of these

documents. Based on its finding, the NRC has decided not to prepare an environmental impact statement for the proposed action.

This FONSI and other related environmental documents are available for public inspection and are accessible online in the ADAMS Public Documents collection at <https://www.nrc.gov/reading-rm/adams.html>. Persons who do not have access to ADAMS or who encounter problems in accessing the

documents located in ADAMS should contact the NRC's PDR reference staff by telephone at 1-800-397-4209 or 301-415-4737, or by email to pdr.resource@nrc.gov.

IV. Availability of Documents

The documents identified in the following table are available to interested persons through the methods indicated.

Document	ADAMS Accession No.
License Amendment Request	
Exelon Generation Company, LLC License Amendment to Braidwood Station, Units 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink." Dated May 27, 2021.	ML21147A543
Other Referenced Documents	
Cairns J. 1956. Effects of heat on fish. <i>Industrial Wastes</i> , 1 :180-183	n/a ⁽¹⁾
Bannon and Van Arman JA. 1973. Thermal effects on eggs, larvae and juveniles of bluegill sunfish. Washington, DC: U.S. Environmental Protection Agency. EPA-R3-73-041.	n/a ⁽¹⁾
Ecological Specialists, Inc	ML15274A093 (Package)
Final Report: Five Year Post-Construction Monitoring of the Unionid Community Near the Braidwood Station Kankakee River Discharge. Dated September 29, 2015.	
Exelon Generation Company, LLC	ML14339A044
Byron and Braidwood Stations, Units 1 and 2, License Renewal Application, Braidwood Station Applicant's Environmental Report, Responses to Requests for Additional Information, Environmental RAIs AQ-11 to AQ-15. Dated April 30, 2014.	
U.S. Fish and Wildlife Service	ML15299A013
Concurrence Letter Concluding Informal Consultation with the NRC for Braidwood License Renewal. Dated October 20, 2015.	
Exelon Generation Company, LLC	ML20197A434
License Amendment to Braidwood Station, Units 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink." Dated July 15, 2020.	
Exelon Generation Company, LLC	ML20227A375
Supplement to License Amendment to Braidwood Station, Unit 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink." Dated August 14, 2020.	
U.S. Nuclear Regulatory Commission	ML15314A814
Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Braidwood Station, Units 1 and Final Report (NUREG-1437, Supplement 55). Dated November 30, 2015.	
U.S. Nuclear Regulatory Commission	ML053040362
Exelon Generation Company, LLC; Docket No. STN 50-456; Braidwood Station, Unit 1 Renewed Facility Operating License. Issued on January 27, 2016.	
U.S. Nuclear Regulatory Commission	ML053040366
Exelon Generation Company, LLC; Docket No. STN 50-457; Braidwood Station, Unit 2 Renewed Facility Operating License. Issued on January 27, 2016.	
U.S. Nuclear Regulatory Commission	ML15322A317
Record of Decision; U.S. Nuclear Regulatory Commission; Docket Nos. 50-456 and 560-457; License Renewal Application for Braidwood Station, Units 1 and 2. Dated January 27, 2016.	
U.S. Nuclear Regulatory Commission	ML16181A007
Environmental Assessment and Finding of No Significant Impact Related to Ultimate Heat Sink Modification. Dated July 18, 2016.	
U.S. Nuclear Regulatory Commission	ML16133A438
Braidwood Station, Units 1 and 2—Issuance of Amendments Re: Ultimate Heat Sink Temperature Increase. Dated July 26, 2016.	
U.S. Nuclear Regulatory Commission	ML20231A469
Environmental Assessment and Finding of No Significant Impact Related to Temporary Revision of Technical Specifications for the Ultimate Heat Sink. Dated September 3, 2020.	
U.S. Nuclear Regulatory Commission	ML20245E419
Braidwood Station, Units 1 and 2—Issuance of Amendments Re: Temporary Revision of Technical Specifications for the Ultimate Heat Sink. Dated September 24, 2020.	

⁽¹⁾ These references are subject to copyright laws and are, therefore, not reproduced in ADAMS.

Dated: June 30, 2021.

For the Nuclear Regulatory Commission.

Joel S. Wiebe,

*Senior Project Manager, Plant Licensing
Branch III, Division of Operating Reactor
Licensing, Office of Nuclear Reactor
Regulation.*

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NUCLEAR REGULATORY COMMISSION

[NRC-2020-0266]

Replacement Energy Cost Estimates for Nuclear Power Plants: 2020-2030

AGENCY: Nuclear Regulatory
Commission.

ACTION: NUREG; issuance.

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) is issuing NUREG-2242, "Replacement Energy Cost Estimates for Nuclear Power Plants: 2020-2030." This report updates previous estimates of replacement energy costs for potential shutdowns of U.S. nuclear electricity-generating units due to a temporary power reactor outage to implement safety modifications or the loss of generation associated with a possible severe reactor accident. The final NUREG largely, is unchanged from the draft issued for public comment but has been revised to reflect the recent change to retirement dates for Byron Units 1 and 2, and Dresden Units 2 and 3.

DATES: NUREG-2242 is available on July 7, 2021.

ADDRESSES: Please refer to Docket ID NRC-2020-0266 when contacting the NRC about the availability of information regarding this document. You may obtain publicly available information related to this document using any of the following methods:

- **Federal Rulemaking Website:** Go to <https://www.regulations.gov> and search for Docket ID NRC-2020-0266. Address questions about Docket IDs to Stacy Schumann; telephone: 301-415-0624; email: Stacy.Schumann@nrc.gov. For technical questions, contact the individual listed in the **FOR FURTHER INFORMATION CONTACT** section of this document.

- **NRC's Agencywide Documents Access and Management System (ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at <https://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact

the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to pdr.resource@nrc.gov. The ADAMS accession number for each document referenced (if it is available in ADAMS) is provided the first time that it is mentioned in this document.

- **Attention:** The PDR, where you may examine and order copies of public documents, is currently closed. You may submit your request to the PDR via email at pdr.resource@nrc.gov or call 1-800-397-4209 or 301-415-4737, between 8:00 a.m. and 4:00 p.m. (ET), Monday through Friday, except Federal holidays.

FOR FURTHER INFORMATION CONTACT:

Pamela Noto, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; telephone: 301-415-6795, email: Pamela.Noto@nrc.gov.

SUPPLEMENTARY INFORMATION:

I. Discussion

The NRC has developed new replacement energy cost estimates for both short and long-term nuclear power plant outages. This NUREG-2242, "Replacement Energy Cost Estimates for Nuclear Power Plants: 2020-2030" (ADAMS Accession No. ML21174A176), updates and replaces the replacement energy cost estimate information in NUREG/CR-4012, Volume 4, "Replacement Energy Costs for Nuclear Electricity-Generating Units in the United States: 1997-2001," and NUREG/CR-6080, "Replacement Energy, Capacity, and Reliability Costs for Permanent Nuclear Reactor Shutdowns" (ADAMS Accession Nos. ML20073J435 and ML20076F500).

This report provides replacement energy costs that have been estimated for the U.S. electricity wholesale market regions with nuclear electricity-generating units, over the 2020-2030 period. These estimates were developed to assist the NRC in evaluating proposed regulatory actions that (1) require safety modifications that might necessitate temporary reactor outages and (2) reduce the potential for extended outages resulting from a severe reactor accident. Estimates were calculated using ABB's PROMOD model and ICF's Integrated Planning Model for North America. The models simulate dispatching a collection of generating units in merit order (*i.e.*, lowest to highest incremental cost of dispatch) until the regional power demand is met. Each generating unit is characterized by the technology and fuel it uses to generate electricity, the unit's heat rate, and the variable and fixed costs

incurred in owning and operating the unit. To estimate the replacement energy cost, the report models a Reference Case, in which all operational nuclear power plants are generating, and an Alternative Case, in which a nuclear generating unit is taken offline so that the next unit in merit order is dispatched to replace the lost generation. The difference in market clearing prices between the two cases is the replacement energy cost.

The resulting wholesale power price projections capture the dynamics and economics of the U.S. electricity markets that provide short and long-term replacement energy cost estimates on a market area basis. Factors that affect replacement energy costs include load growth, replacement sources of generation, fuel prices, air emission requirement outlooks and seasonal variations.

II. Public Outreach

Following development of the updated report, the NRC posted the draft NUREG-2242 to the Federal Rulemaking website at <https://www.regulations.gov> for a 60-day public comment period (85 FR 82528; December 18, 2020). The comment period closed on February 16, 2021. The NRC received no comments on the draft NUREG. The NRC staff held a Category 3 public meeting on November 18, 2020 to discuss the updated replacement energy cost estimates. The NRC presentation can be found in ADAMS under Accession No. ML20322A003, and the meeting summary can be found in ADAMS under Accession No. ML20336A181.

III. Backfitting, Forward Fitting, and Issue Finality

The NRC's issuance and use of this report do not constitute backfitting as that term is defined in Section 50.109 of title 10 of the *Code of Federal Regulations* (10 CFR), "Backfitting," and as described in NRC Management Directive (MD) 8.4, "Management of Backfitting, Forward Fitting, Issue Finality, and Information Requests"; do not affect the issue finality of an approval under 10 CFR part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants" and do not constitute forward fitting as that term is defined and described in MD 8.4.

Dated: June 30, 2021.

For the Nuclear Regulatory Commission.

Kevin A. Coyne,

*Deputy Director, Division of Rulemaking,
Environmental, and Financial Support.*

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